ifm electronic

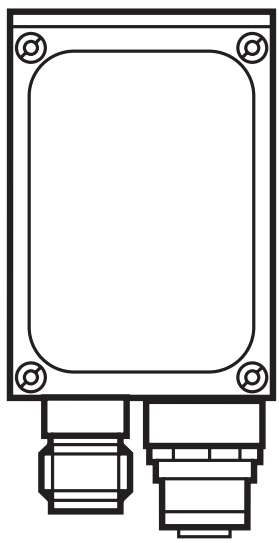
CE

Operating instructions
Object inspection sensor

UK

efector250®

O2V



706099 / 00 12 / 2011

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1 Preliminary note

1.1 Symbols used

► Instructions
> Reaction, result

[…] Designation of pushbuttons, buttons or indications

⚠ Reference to the kind and source of a hazard Instruction to avoid a hazard

→ Target, reference

2 Safety instructions

These instructions are part of the device. They contain information and illustrations about the correct handling of the device and must be read before installation or use.

Observe the operating instructions.

Non-observance of the instructions, operation which is not in accordance with use as prescribed below, wrong installation or incorrect handling can affect the safety of operators and machinery.

The installation and connection must comply with the applicable national and international standards. Responsibility lies with the person installing the unit.

Only the signals indicated in the technical data or on the device label may be supplied to the connections or wires.

3 Items supplied

1 object inspection sensor O2V

1 screwdriver to set the image definition

1 operating instructions "Object inspection sensor O2V“, ident no.: 706099

The device is supplied without installation/connection accessories or software.

3.1 Accessories

www.ifm.com → data sheet search → e.g. O2V100 → Accessories

4 Functions and features

The object inspection sensor monitors an object for completeness, shape deviations or colour changes. The unit uses incident light or back light to detect a grey-scale pattern of the object. On the basis of the determined brightness values the sensor differentiates between the object to be monitored and the background.

Then the unit compares the image found with one or several models in a reference image. Depending on the degree of conformity the output can indicate if a model was found or which one was found.

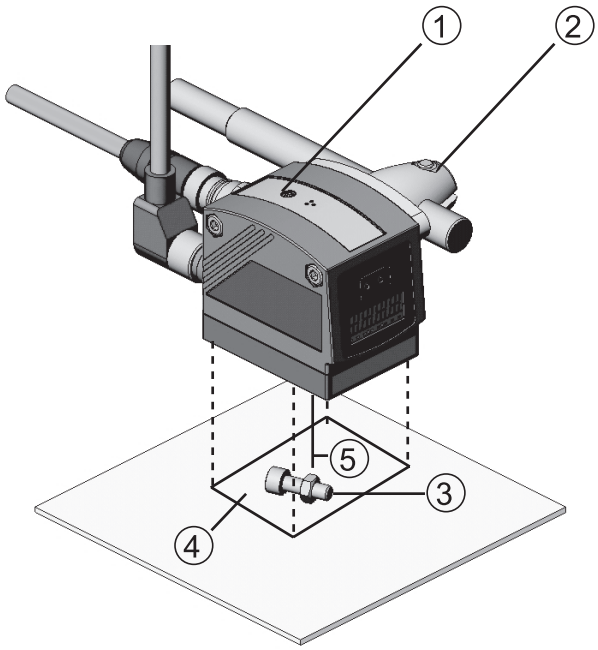
5 Installation

5.1 Mounting accessory

The device is compatible with the mounting accessories for ifm's photoelectric sensors of the O2Dxxx (object recognition sensor), O2Ixxx (multicode reader) series etc.

Example mounting with clamp and bracket

► Use the mounting accessory E2D110.



1. Focal setter
2. Mounting accessory
3. Object to be recognised
4. Field of view size W X H
5. Operating distance L

Depending on the intended location and type of mounting the following mounting accessories are available:

Description	Art. no.
Mounting set for shaft Ø 12 mm (clamp and bracket for types O2Dxxx, O2Mxxx, O2Ixxx, O2Vxxx)	E2D110
Shaft, straight Ø 12 mm, length 130 mm, M10	E20938
Shaft, angled Ø 12 mm, length 200 mm, M10	E20940
Mounting set for shaft Ø 14 mm (clamp and bracket for types O2Dxxx, O2Mxxx, O2Ixxx, O2Vxxx)	E2D112
Shaft, straight Ø 14 mm, length 130 mm, M12	E20939
Shaft, angled Ø 14 mm, length 200 mm, M12	E20941

You can find more information about the available accessories at:
www.ifm.com → data sheet search → e.g. O2V100 → Accessories
or directly
www.ifm.com → data sheet search → e.g. E2D110

5.2 Mounting dimensions

The device is mounted using the mounting accessories or 2 M4 screws and nuts.
Hole dimensions → Chapter 10 Scale drawing.

5.3 Installation location

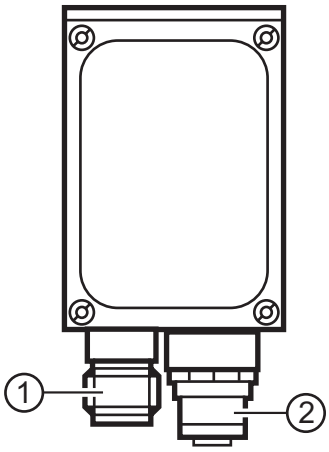
- ► Mount the sensor in front of or above the area to be monitored.The detectable field of view size depends on the operating distance → Chapter 11.1 Technical Data.
- ► Back light or scattered light situations and continuously changing light conditions are to be avoided.
- ► Do not position room lights directly facing the camera lens.
- ► Position the optional external illumination (e.g. O2D905) opposite the camera lens.
- ► To avoid adverse effects on the image detection, avoid installation in dirty areas of the machine.
- ► The connected cables must be provided with a strain relief.

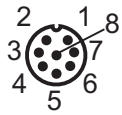
6 Electrical connection

NOTE

The unit must be connected by a qualified electrician.Disconnect power before connecting the unit.

6.1 Wiring



Process interface (1)	
M12 plug, A-coded, 8 poles (view on the unit)	
	1 U+ 2 trigger input 3 0V 4 switching output / trigger output 5 switching output (ready) 6 switching output (OUT) 7 switching output / input 1 8 switching output / input 2
Parameter/process interface (2)	
M12 socket, D-coded, 4 poles (view on the unit)	
	1 Ethernet TD + 2 Ethernet RD + 3 Ethernet TD - 4 Ethernet RD - S Screen

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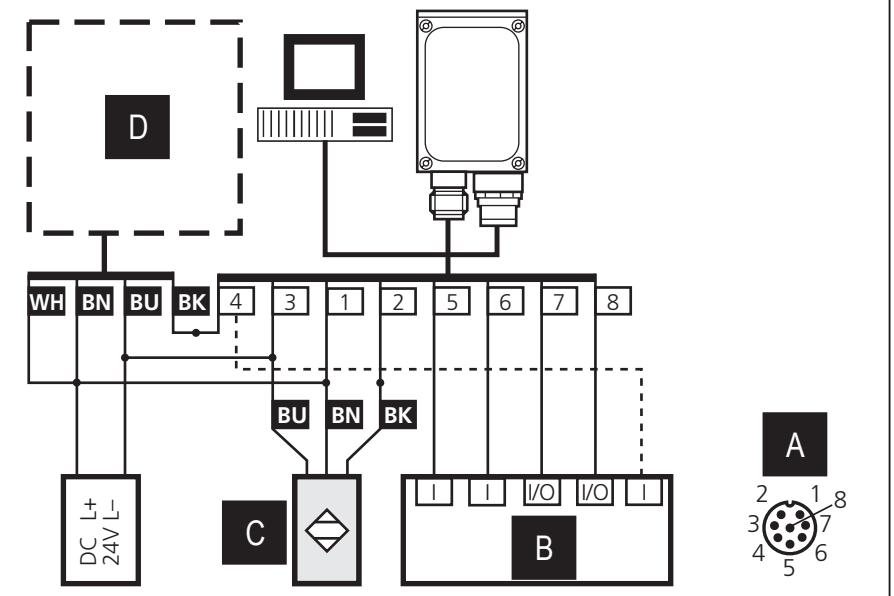
6.2 Wiring



A: process interface

B: controller e.g. PLC

C: external trigger

D: external illumination (optional)

Pin	Use (factory setting)
5	Output signal "READY" provides the status of the sensor: "1" after the evaluation has been carried out. "0" as long as the evaluation is being carried out, a different application is being selected or in case of an internal error (trigger signals are ignored).
6	Output signal "OUT" provides the result of the evaluation: "0" no matching model "1" matching model

6.3 External illumination

► Connect external illumination to the trigger output of the device.

Example	Art. no.
Backlight, 100 x 100 mm, infrared light 880 nm	O2D905

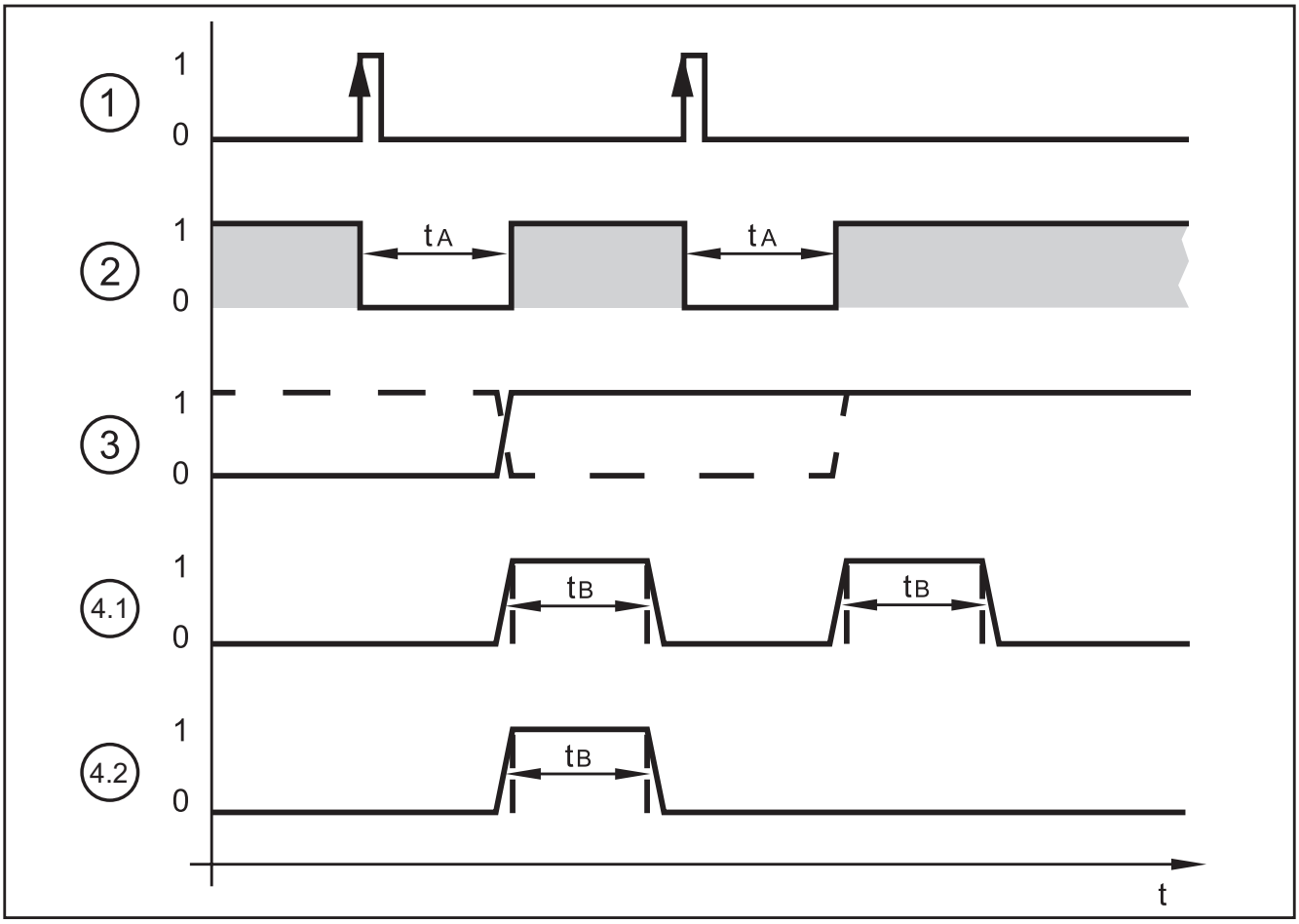
For information about the example above see:
www.ifm.com → data sheet search → O2D905

6.4 External trigger source

► Connect an external trigger source (e.g. a diffuse reflection sensor) to the trigger input of the device.

6.5 Timing diagrams

6.5.1 Inputs/outputs



Example: Triggering positive edge

1:	trigger input	trigger signal 0: no action 1: triggering on positive edge	
2:	output READY	ready signal 0: unit busy, OUT output not valid 1: unit ready for trigger signal, OUT output valid	
3:	OUT output, static	object evaluation 0: object evaluation not successful 1: object evaluation successful	
		example 1 (dashed line): last object OK, OUT = 1 next object faulty, OUT 1 → 0 next object OK, OUT 0 → 1	example 2 (solid line): last object faulty, OUT = 0 next object OK, OUT 0 → 1 next object OK, OUT = 1
4	OUT output, pulsed	object evaluation 0: object evaluation not successful or timeout of pulse length 1: object evaluation successful	
		example 4.1: both objects OK, OUT = 1 after expiration of $t_{B,}$ OUT = 0	example 4.2: first object OK, OUT = 1 after expiration of $t_{B,}$ OUT = 0 second object faulty, OUT = 0

The evaluation time t_A depends on

- the size of the field of view selected
- the model size
- the selected inspection characteristics
- the number of models

Typical evaluation times are between 100 and 500 ms.

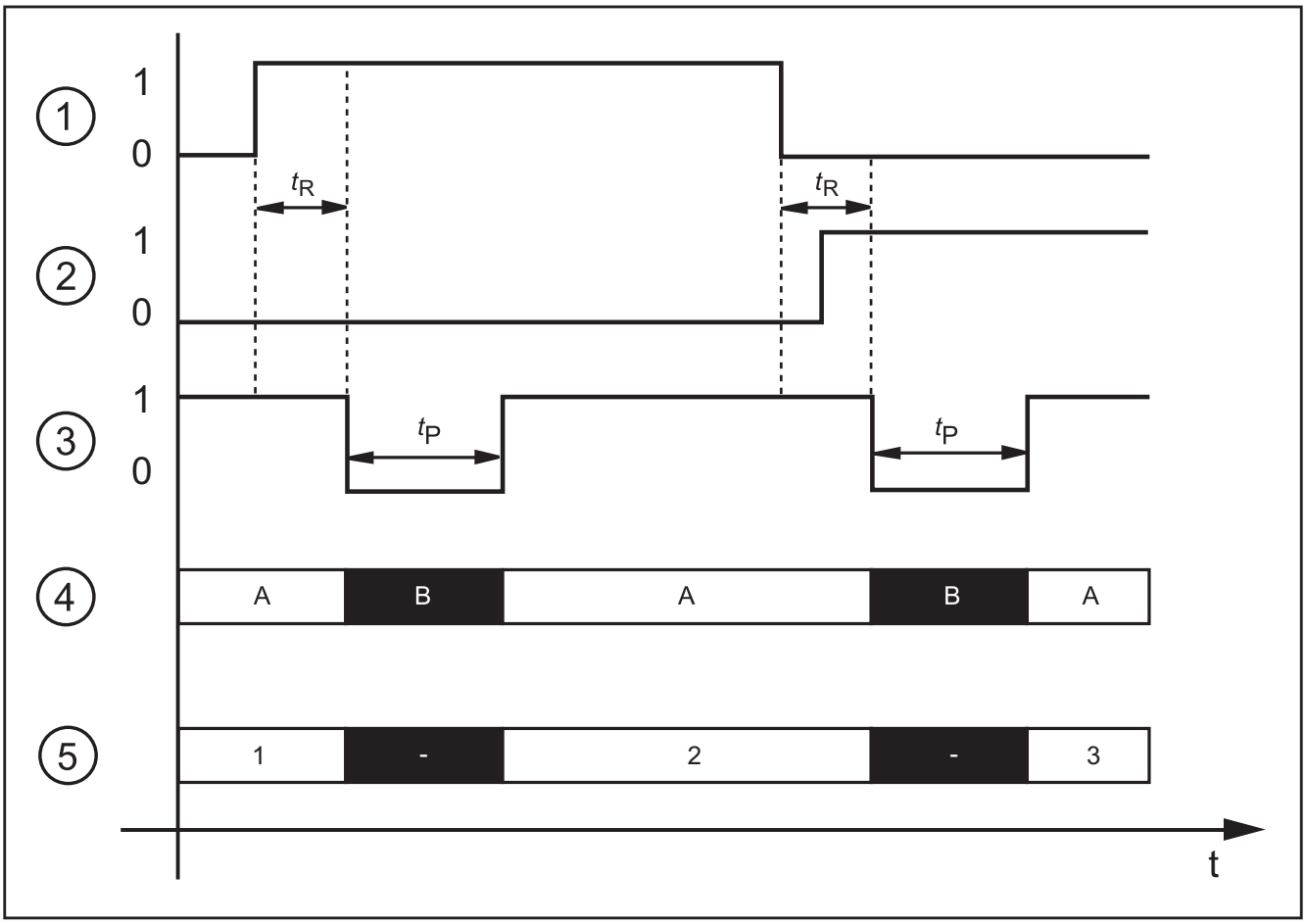
The pulse length t_B can be set between 100 ms and 2000 ms via the PC user program. For more detailed information about the configuration of the switching outputs we refer you to the programming manual of the sensor.

www.ifm.com → data sheet search → O2V100 → Operating instructions

6.5.2 Static selection of the application

Up to 32 different inspection tasks can be stored in the sensor. With the corresponding unit configuration the first four applications can be selected via the two switching inputs.

Input 2	Input 1	Application no.
0	0	1
0	1	2
1	0	3
1	1	4



Example: Selection application 1 → application 2 → application 3

1:	switching input 1 = 0 → 1 → 0
2:	switching input 2 = 0 → 0 → 1
3:	output READY
4:	trigger input
	A: trigger enabled
	B: trigger disabled
5:	ID number of the active application

For the selection of the applications the monitoring time t_R and the trigger disable time t_P have to be taken into consideration.

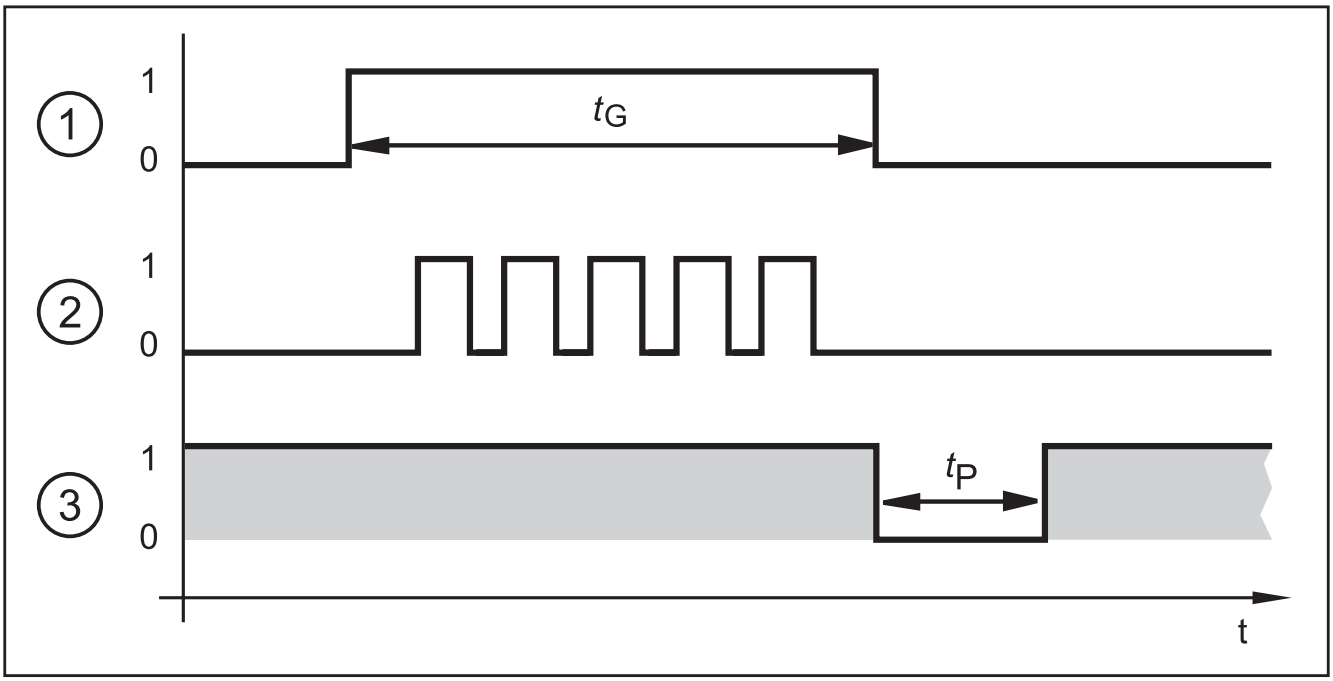
Monitoring time t_R: After a change in edges on one switching input the unit will wait for a change in edges on the other switching input for 500 ms. Only then will the active application be changed.

Trigger disable time t_P: The trigger input is disabled during the selection of the application. The disable time depends on:

- the number of applications on the sensor
- the number of models in the application to be activated

6.5.3 Pulse-controlled selection of the application

As an alternative to the static selection the selection of the application can also be pulse-controlled.



1:	gate signal, switching input 1 = 0 → 1 → 0 (t_G = signal active)
2:	pulse signal, switching input 2 or trigger input = 0 → 5 pulses → 0
3:	READY output

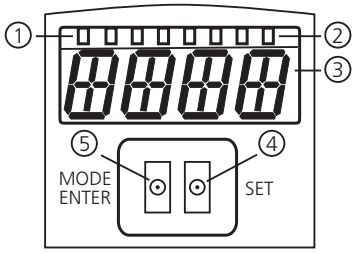
While there is an active signal on switching input 1 (gate signal), the sensor counts incoming pulses and activates the respective application.

Number of pulses = ID number of the application

Either the 2nd switching input or the trigger input of the sensor can be used as pulse input.

For more detailed information about the configuration of the selection of the application we refer you to the programming manual of the sensor. www.ifm.com → data sheet search → O2V100 → Operating instructions

7 Operating and display elements



1	3 x LED green	Active LED Power (ready for operation display) Eth (Ethernet connection status) Con (connection status to the operating program (software))
2	4 x LED yellow	Indication of the switching status; lights when the corresponding input or output is switched. LED 1 status indication switching output 1 / switching input 1 LED 2 status indication switching output 2 / switching input 2 LED 3 status indication switching output 3 LED 4 status indication switching output 4
3	4-digit alphanumeric display	Indication of the evaluation results, parameters, parameter values, warnings and error messages.
4	Programming button "Set"	Setting of the parameter values (scrolling by holding pressed; incremental by pressing briefly).
5	Programming button Mode / Enter	Selection of the parameters and acknowledgement of the parameter values.

7.1 LED display

- LED green Power: ready for operation display
  - lights: ready for operation
  - flashes (20 Hz): device fault
  - flashes (2 Hz): no application on the device
- LED green Eth: Ethernet connection status
  - lights: connection available
  - flashes: data traffic
- LED green Con: connection status to operating program
  - lights: connection available
- LED yellow 1: switching status indication
  - off: switching input 1 / switching output 1 not switched
  - on: switching input 1 / switching output 1 switched
  - flashes (20 Hz): short circuit switching output 1
- LED yellow 2: switching status indication

  - off: switching input 2 / switching output 2 not switched
  - on: switching input 2 / switching output 2 switched
  - flashes (20 Hz): short circuit switching output 2
- LED yellow 3: switching status indication
  - off: switching output 3 not switched
  - on: switching output 3 switched
  - flashes (20 Hz): short circuit switching output 3
- LED yellow 4: switching status indication
  - off: switching output 4 not switched
  - on: switching output 4 switched
  - flashes (20 Hz): short circuit switching output 4

7.2 Display

7.2.1 Operating indicators

Display	Description
vNNN	Version number of the IO controller software (1st indication after power on, e. g, v0006)
Init	Device initialisation after power on (2nd indication after power on)
NNNN	Firmware version, e.g. 5036 3rd indication after power on)
rEdY	Device ready for trigger (4th indication after power-on if one configuration is active with external triggering. Device waiting for triggering.)
WAIT	Device is busy, device is waiting for parameter setting
run	Device waiting for connection, no application active (factory setting)
LOAd	Loading an application
donE	Loading of application completed
rEbO	Unit reboots
uLoc	Keys unlocked Parameter values can be displayed and changed
Lock	Locking the pushbuttons
Lok1	Pushbuttons locked
Lok2	Changing parameters locked
FWUP	Firmware update running

7.2.2 Evaluation results

Display	Description
NNNN	• Firmware version of the sensor (e.g. 5036) or • Number of detected objects (e.g. 0010) or • Number of identified objects (e.g. 0005)
nrNN	ID number of the running application (e. g. nr01)
(off)	Display switched off
OK	Application passed
PASS	Application passed
NoOK	Application not successful
FAIL	Application not successful

The display after the evaluation can be set via the operating program. For further information we refer you to the programming manual.

7.2.3 Connection via the operating program

Display	Description
OnLI	Connection with the operating program
Parm	Parameter setting via operating program
Edit	Processing an application
Moni	Monitor mode
SerP	Connection with the operating program, service report mode

7.2.4 Error messages

Display	Description
ErrD	Critical hardware error
SC	Short circuit of a switching output
DHCP noIP	No DHCP server found. Both character strings are displayed alternately.

7.3 Pushbuttons

Button	Function
MODE/ENTER	Change into the parameter setting mode Selection of the parameters Acknowledgement of the parameter values
SET	Selecting the subparameters Setting/changing/selecting the parameter values - incremental by pressing briefly - hold down to scroll

8 Set-up

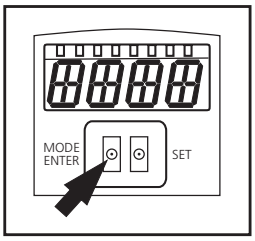
Set-up is carried out via a menu-driven PC operating program. The device stores up to 32 applications.

8.1 Parameter setting on the unit

Set the parameter values via pushbuttons and display on the device.

The sensor is programmed using the two buttons [Mode/Enter] and [Set].

First activate a parameter with the [Mode/Enter] button, select the required value with the [Set] button and confirm it pressing again the [Mode/Enter] button.

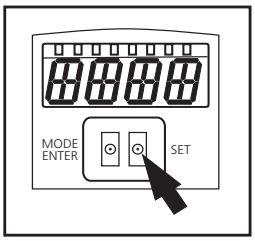


The unit changes to the parameter setting mode when you

► press [MODE/ENTER] for more than 1 s.

> The first menu item is displayed.

► Press [MODE/ENTER] several times until the required parameter is displayed.



► Press [SET].

► The menu item is activated and the current setting is displayed.

► Keep [SET] pressed.

> The display flashes, after 5 s with SET button pressed the display stops flashing.

► Press [SET] and change setting.

► Press [Mode/Enter].

> The change is acknowledged and the previous menu item is shown again.

If no button is pressed for longer than 15 s, you will get to the next higher menu item or the evaluation mode.

The device does not operate during use of the pushbuttons.

8.2 Verify and set the IP address on the unit

► Select the parameter "IP" (IP address) with [MODE/ENTER] and [SET].

> The IP address is processed automatically and shown in 4 groups (A, b, C, d).

► Verify the IP address and set with [SET], if necessary.

Changes only become effective after a restart of the unit (power off, power on).

8.3 Adjustable parameters

APP	**Memory location** Select an application. The device can save up to 32 applications. By pressing the SET button the memory location number is incremented in the display. The current state of the memory location is visualised in the first digit of the display: F = memory location available I = memory location used by an inactive application A= memory location used by an active application E = memory location (selected by external selection of the application)
nET	**Network operation** Here you set the parameters for network operation.
DHCP	**Network settings via DHCP** If the sensor is to get its network settings via DHCP, select the setting "on" in this menu item. With the setting "off" the fixed network settings (see next menu items) are used.In the DHCP mode the sensor must be operated in a network with DHCP server. Otherwise it is not accessible via the operating program E2V100.
IP	**Set IP address** Here the IP address of the sensor is set. This setting is used when the sensor does not work in the DHCP mode.The input is made in the "dotted decimal notation", e.g. 192.168.0.3. Using the SET button you can select the four groups of the address. The respective group is visualised by a letter in the first digit of the display.
nETm	**Set subnet mask** Here the subnet mask of the sensor is set. This setting is used when the sensor does not work in the DHCP mode.The subnet mask must match the IP address. It is input in the same way as the IP address.
GWIP	**Set gateway address** Here the gateway address used by the sensor is set. This setting is used when the sensor does not work in the DHCP mode. It is input in the same way as the IP address.
EF	**Access extended functions** Here the extended functions of the sensor are accessed.
di S	**Rotate / switch off display** Here you set whether a text is displayed normally (d) or rotated by 180° (rd). You also set whether the display is to be switched off (oFF) in the evaluation mode.
r-ES	**Reset sensor** Here you reset the sensor to the factory setting.
FW	**Firmware version** In this menu item you can enquire about the firmware version of the sensor.
r-Eb	**Reboot sensor** Here you reboot the sensor without having to disconnect the power supply.

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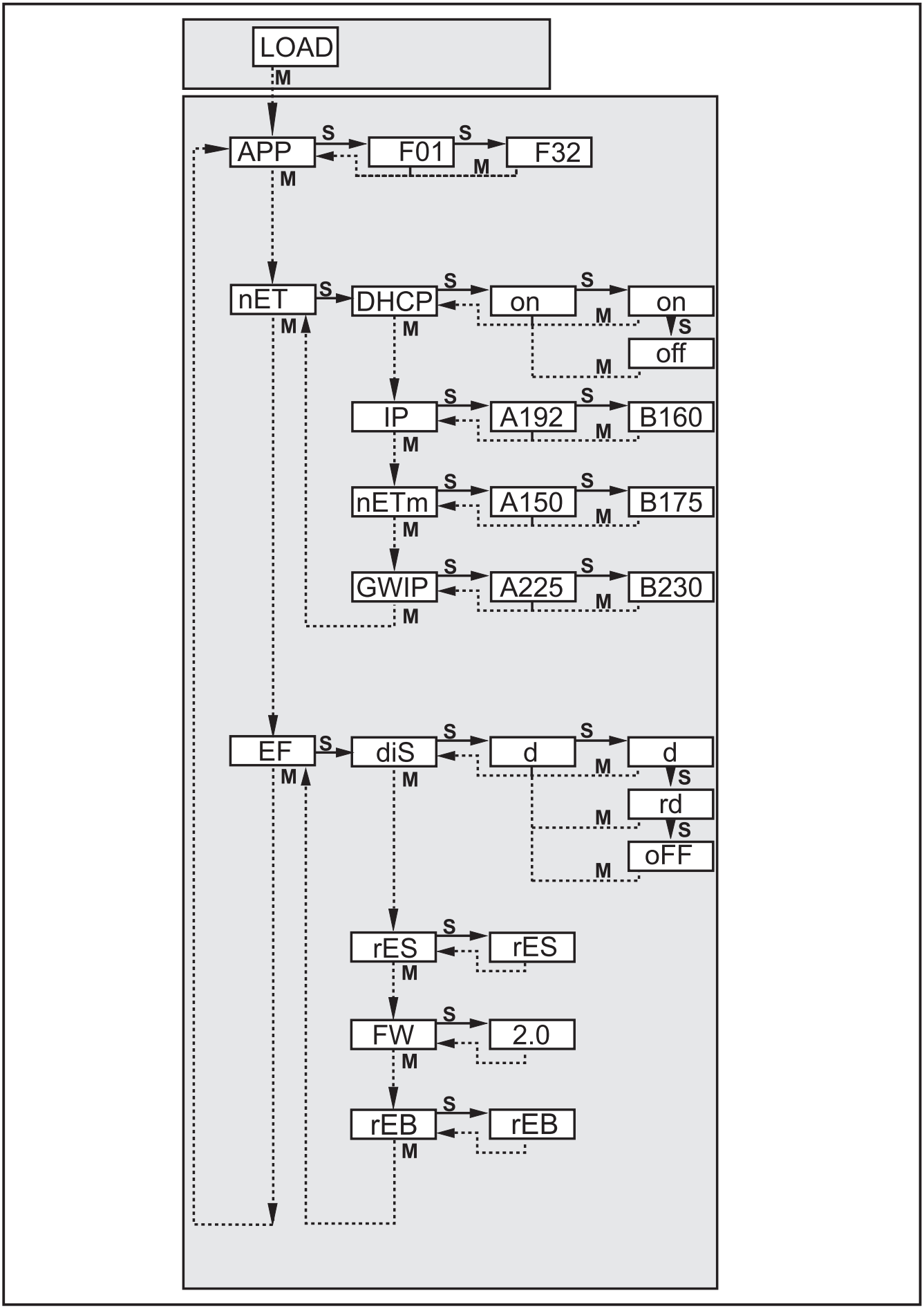
8.3.1 Parameter structure



8.4 Lock / unlock sensor

8.4.1 Lock the reading or changing of sensor parameters.

► Keep [Mode/Enter] and [Set] pressed simultaneously for 10 s.
> Display changes to uLok.
► Press [Set].
> Display changes to Lok1.
► Confirm with [Mode/Enter].
> The sensor is locked. Parameters can neither be displayed nor changed.

8.4.2 Lock changing of sensor parameters.

► Keep [Mode/Enter] and [Set] pressed simultaneously for 10 s.
> Display changes to uLok.
► Press [Set] twice.
> Display changes to Lok2.
► Confirm with [Mode/Enter].
> The sensor is locked. Parameters are displayed but cannot be changed.

8.4.3 Unlock the sensor

► Keep [Mode/Enter] and [Set] pressed simultaneously for 10 s.
> Display indicates Lok1 or Lok2.
► Press [Set] several times, if necessary, until uLok is displayed.
► Confirm with [Mode/Enter].
> The sensor is unlocked, display changes to "run".

8.4.4 Reset device to factory settings

► Activate the parameter "rES".

► Press [SET] > 5 s.

> Device is reset to the factory settings → Chapter 11.2.

When the device is reset to the factory settings, all application settings, applications and images saved on the sensor are deleted.

8.4.5 Reboot the unit.

► Activate the parameter "rEB".

► Press [SET] > 5 s.

> Unit reboots

8.5 Parameter setting via PC operating program

The PC operating program is described in a separate document → Programming manual E2V100.

www.ifm.com → data sheet search → E2V100 → Additional data

9 Operation

9.1 Evaluation mode (normal operating mode)

After power-on the device is in the evaluation mode. If an active application is saved on the device, it carries out its monitoring function and generates output signals according to the set parameters. The display indicates the current evaluation result, the yellow LEDs signal the switching status of the outputs or inputs.

10 Scale drawing

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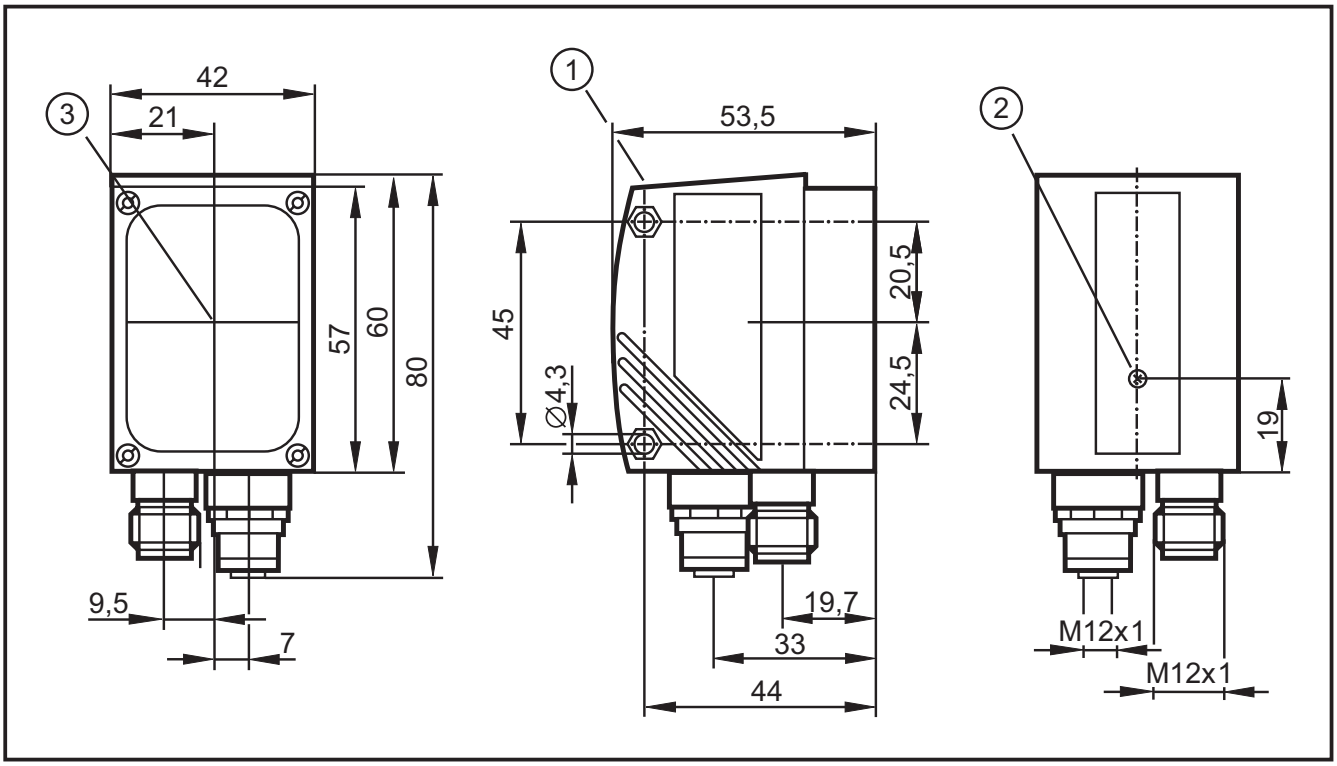

1. Operating and display elements
2. Focal setter
3. Middle of the optical axis

11 Technical data

11.1 Operating distance L

When selecting the operating distance it has to be taken into account that detection becomes less reliable with decreasing relative size of the objects. The objects to be detected should cover at least 5% of the field of view. For the operating distance L depending on the applications please see the following table.

Type O2V100							
Operating distance L [mm]	50	75	100	200	400	1000	2000
Field of view size WxH [mm]	16x12	24x18	32x24	64x48	130x97	320x240	640x480
Resolution [mm]	0.03	0.04	0.05	0.1	0.2	0.5	1.0

Type O2V102							
Operating distance L [mm]	50	75	100	200	400	1000	2000
Field of view size WxH [mm]	33x23	50x35	66x47	130x95	260x190	660x470	1300x950
Resolution [mm]	0.05	0.07	0.1	0.2	0.39	0.98	1.97

Type O2V104							
Operating distance L [mm]	50	75	100	200	400	1000	2000
Field of view size WxH [mm]	-	15x11	20x15	40x30	80x60	200x150	400x300
Resolution [mm]	-	0.02	0.03	0.06	0.13	0.31	0.63

11.2 Factory settings

Parameter	Factory setting
Device name	New sensor
Device location	New location
DHCP	not active
IP address	192.168.0.59
Subnet mask	255.255.255.0
Gateway	192,168,000,201
IP communication port	8080
UDP live image port	50002
Application selection via switching inputs	not active
Trigger debouncing	not active
Process interface mode	TCP/IP
Process interface version	2
Process interface TCP/IP port	50010
Saved applications	none
Application settings	none
Saved images	none

12 Process data protocol

The process interface ensures communication between the process PC (e.g. PLC) and the device. A command from the process PC can for example activate trigger pulses, select applications or provide application results.

12.1 Configuring the process interface

When the Ethernet interface is used, two protocols are available: TCP/IP and EtherNet/IP. The protocol is selected and configured in the PC operating program.

For more detailed information about the configuration of the process interface we refer you to the programming manual of the sensor.

www.ifm.com → data sheet search → O2V100 → Operating instructions

12.2 Communication basics

- 8-bit ASCII characters are allowed.
- All transmissions to the device are terminated with a carriage return and a linefeed character (CR + LF = ASCII 13 dec + 10 dec).
- All transmissions from the device are terminated with a carriage return and a linefeed character (CR + LF = ASCII 13 dec + 10 dec).
- As a reply to a valid command the device provides the character string
  * CR LF (ASCII 42 dec + 13 dec + 10 dec).
- As a reply to an invalid command the device provides the character string
  ? CR LF (ASCII 63 dec + 13 dec + 10 dec).
- If the device cannot execute a message, the device delivers the character string
  ! CR LF (ASCII 33 dec + 13 dec + 10 dec).

12.3 Protocol versions

The device supports 4 different protocol versions with different message format.

Version	Format
V1	<contents>CR LF
V2	<ticket><contents>CR LF
V3	<ticket><length>CR LF <ticket><contents>CR LF
V4	<length>CR LF <contents>CR LF

<contents>	is the command to the device or the reply by the device (e.g. evaluation results).
<ticket>	is a character string of 4 digits 0-9, to be interpreted as decimal number. If a message with a specific ticket is sent to the device, its reply will contain the same ticket. Ticket 0000 is reserved for messages sent by the device independently.
<length>	is a character string beginning with the letter 'L' followed by 9 digits to be interpreted as decimal number. This figure indicates the length of the following data (<ticket><contents>CR LF) in bytes.
CR	Carriage Return
LF	Line Feed

Factory setting and reset condition are V2.

12.4 Command types

There are two different types of command to the device: actions and requests. Actions have the device do something, e.g. take an image and evaluate it.

Requests are used to retrieve information from the device.

The replies by the device are either status information, reply messages or results.

Results are transmitted by the device without a request being sent to the device before.

The device transmits status information and reply messages as direct reply to action commands or request commands.

12.5 Requesting the trigger pulse

Command	t	
Description	Release the trigger and evaluate the image.	
Type	Action	
Reply	*	Trigger was released, the device captures the image and evaluates it.
	!	● The device is busy with evaluation. ● The device is in an invalid state, e.g. administer applications. ● Another trigger source has been selected for the device.
Note		Activation of the output → Activate / deactivate result output (p1). Result output via the process interface if output via the process interface is activated (per operating program).

12.6 Release trigger, evaluate captured image and result output via process interface

Command	T?	
Type	Request	
Reply	Message in result format → Chapter result message 12.20.	Device triggers, captures image and evaluates it.
	!	● Currently no application active. ● Application is being edited. ● Currently set trigger mode not possible via TCP/IP.
Note	The result is always provided via the process interface; with activated and also non-activated output via the process interface.	

12.7 Select protocol version

Command	v <digit><digit>	
Type	Action	
Reply	*	Normal case
	!	The device does not support the protocol version indicated.
Note	<digit><digit>: to be interpreted as two-digit decimal number for the protocol version. The protocol version is not changed before the reply by the device.	

12.8 Select the application

Command	c <group><number>	
Type	Action	
Reply	*	Successful change
	!	● The device is in an invalid state, e.g. administering applications. ● Invalid or not existing group or application number.
Note	<group>: digit for the application group (always 0 for O2V10X). <number>: two-digit character string, to be interpreted as decimal number for the application number.	

12.9 activate/deactivate result output

Command	p <digit>	
Type	Action	
Reply	*	Successful execution
	!	● No active application. ● <digit> contains incorrect value. ● The device is in an invalid state.
Note	<digit> is either 0 or 1. 1 enables the result output. 0 disables the result output. See command T?.	

12.10 Transmit the application data set to the device

Command	u <length><group><number><application data set>	
Type	Action	
Reply	*	Normal case
	?	Invalid length
	!	● The device is in teach mode or in administrative mode. ● <application data set> is no valid application. ● The group/application number is invalid. ● "Selection of the application" via digital switching inputs is activated.
Note	<length>: character string with exactly 9 digits, interpreted as decimal number it indicates the length of the following image data in bytes. (file length + 3 for group and number). <group>: digit for the application group (always 0 for O2V10X). <number>: two-digit character string, to be interpreted as decimal number for the application number.	

12.11 Request the assignment of the application data from the device

Command	a?	
Type	Request	
Reply	<number><blank><group><number><blank><group><number><blank>...<group><number>	Normal case
	!	No application active on the device.
Note	<number>: character string with 3 digits for the number of applications on the device as decimal number. <group>: digit for the application group (always 0 for O2V10X). <number>: two-digit character string, to be interpreted as decimal number for the application number. At first the number of the active configuration is output. <blank>: individual blank.	

12.12 Request the statistics from the device

Command	s?	
Type	Request	
Reply	<total><blank><good><blank><bad>	Normal case
	000000000 000000000 000000000	No application active on the device.
Note	<total>: total number of evaluations. <good>: number of "good" evaluations. <bad>: number of "bad" evaluations. <blank>: individual blank. <total>, <good> and <bad> are always character strings with 10 digits, to be interpreted as decimal number.	

12.13 Request the error code from the device

Command	E?
Type	Request
Reply	<code>
Note	<code> is the error code, character string with 4 digits, to be interpreted as decimal number. Chapter Error codes 12.21

12.14 Request the last image from the device

Command	I?	
Type	Request	
Reply	<length><image data>	Normal case
	!	● Currently no application active. ● No evaluation carried out. ● Sensor is working. ● EtherNet/IP defined as process interface
Note	<length>: character string with exactly 9 digits, interpreted as decimal number it indicates the length of the following image data in bytes. Image data format according to setting in the operating program. The command is not available when the EtherNet/IP protocol is used.	

12.15 Request the last result from the device

Command	R?	
Type	Request	
Reply	Message in result format → Chapter result message 12.20.	Normal case
	!	● Currently no application active. ● Application is being edited. ● No results available yet.
Note	none	

12.16 Request the protocol version

Command	V?
Type	Request
Reply	<current><blank><min><blank><max> <current> two-digit decimal number with current version <blank> space character <min> two-digit decimal number with minimum version <max> two-digit decimal number with maximum version
Note	none

12.17 Request the device information

Command	D?
Type	Request
Reply	<manufacturer><t><article number><t><name><t><location><t><ip> <subnet mask><t><gateway><t><MAC><t><DHCP><t><port number> <manufacturer> IFM ELECTRONIC <article number> article designation and status, e.g. O2V100AA <name> enter the sensor name as in the operating program <location> enter the sensor location as in the operating program <ip> IP address of the device <subnet> subnet mask of the device <gateway> gateway address of the device <MAC> MAC address of the device <DHCP> 0 if DHCP is disabled, 1 if DHCP is enabled <t> tabulator character <port> parameter setting port number
Note	none

12.18 Request the last "bad" image from the device

Command	F?	
Type	Request	
Reply	<length><image data>	Normal case
	!	● Currently no application active. ● No evaluation carried out or no error occurred. ● Sensor is working. ● EtherNet/IP defined as process interface
Note	<length>: character string with exactly 9 digits, interpreted as decimal number it indicates the length of the following image data in bytes. Image data format according to setting in the operating program. The command is not available when the EtherNet/IP protocol is used.	

12.19 Request help for process interface

Command	h?
Type	Request
Reply	h? - this command list b - activate or deactivate the performance boost functionality c - select configuration p - activate result output via PCIC t - trigger device u - upload application v - set protocol version a? - request configuration D? - request device info E? - show last error F? - request last error image read I? - request last image read R? - request last decoding result s? - request statistics T? - trigger device and wait for result V? - show protocol version
Note	List of all available commands

12.20 activate/deactivate boost mode

Command	b<digit>	
Type	Action	
Reply	*	Successful execution
	!	• Device is in invalid state (only possible in parm/wait state) • <digit> contains incorrect value
Note	<digit> is either 0 or 1 1 activates the boost mode. 0 deactivates the boost mode.	

12.21 Result message

Several formats are available to transfer the evaluation results. They are selected and set via the PC operating software.

For more detailed information about the configuration of the result message we refer you to the programming manual of the sensor.

www.ifm.com → data sheet search → O2V100 → Operating instructions

Format	Contents
Only switching outputs	<start>< switching outputs><stop>
Number of matching objects	<start><number objects><stop>
Model information	<start><number objects><#><number models>[<model details>]<stop>
Detailed object output	<start><number objects><#><number models>[<model details>]<objects stop>
Optimised for Ethernet/IP	<display><number objects bin>[<model details objects bin>]<stop>

Description of the components

Component	Description
<start>	Start string : "start“, text (length: 5 characters)
<stop>	Stop character string: "stop“, text (length: 4 characters)
<switching outputs>	Status of the switching outputs after the evaluation. The state of each switching output is indicated as "0" (not active) or "1" (active), order: SA1 SA2 SA3 SA4 SA5 (e.g. "00110"). Text (length: 5 characters)
<number objects>	Number of identified objects text (length: 4 characters, filled with "0", e.g. for 45 objects -> "0045")
<#>	Separator: „#“, text (length: 1 character)
<number models>	Number of models in the current application Text (length: 2 characters, filled with "0" , e.g. for 2 models -> "02")
<number objects bin>	Number of identified objects Binary value (2 bytes, e.g. for 45 objects -> 0x2D)

Component	Description	
[<model details>]	Detailed information about each model of the current application. Each model has the following content: <#><model id><#><total area><#><number matching objects>	
	<model id>	ID number of the model text (length: 2 characters, filled with "0", e.g. for model ID 2 -> "02")
	<total area>	Total area (in pixels) of all identified objects of the model text (length: 6 characters, filled with "0", e.g. for an area of 2100 pixels -> "002100")
	<number matching objects>	number of identified objects of the model. text (length: 4 characters, filled with "0", e.g. for 45 objects -> "0045")
[<model details objects>]	Detailed information about each model of the running application, contains information about all identified objects. Each model has the following content: <#><model id><#><total area><#><number matching objects> [<object details>]	
	<model id>	ID number of the model text (length: 2 characters, filled with "0", e.g. for model ID 2 -> "02")
	<total area>	Total area (in pixels) of all identified objects of the model text (length: 6 characters, filled with "0", e.g. for an area of 2100 pixels -> "002100")
	<number matching objects>	number of identified objects of the model.Text (length: 4 characters, filled with "0", e.g. for 45 objects -> "0045")
[<object details>]	Detailed information about each identified object of the model. Each object has the following content: <#><model id><object id><#><x pos><#><y pos><#><object surface>	
	<model id>	ID number of the model text (length: 2 characters, filled with "0", e.g. for model ID 2 -> "02")
	<object id>	ID number of the object text (length: 2 characters, filled with "0", e.g. for object ID 2 -> "02")
	<x pos>	x coordinate of the object's centre of gravity text (length: 3 characters, filled with "0", e.g. for x coordinate 125 -> "125"
	<y pos>	y coordinate of the object's centre of gravity text (length: 3 characters, filled with "0", e.g. for y coordinate 65 -> "065"
	<object surface>	Surface (in pixels) of the object text (length: 6 characters, filled with "0", e.g. for a surface of 35025 pixels -> "035025")

Component	Description	
[<model details objects bin>]	Detailed information about each model of the running application, contains information about all identified objects. Binary output. Each model has the following content: <model id bin>[<object details bin>]	
	<model id bin>	ID number of the model binary value (2 bytes, e.g. for model ID 2 -> 0x02)
[<object details bin>]	Detailed information about each identified object of the model. Binary output. Each object has the following content: <object id bin><x pos bin><y pos bin><object surface bin>	
	<object id bin>	ID number of the object binary value (2 bytes, e.g. for object ID 5 -> 0x05)
	<x pos bin>	x coordinate of the object's centre of gravity binary value (2 bytes, e.g. for x coordinate 125 -> 0x7D)
	<y pos bin>	y coordinate of the object's centre of gravity binary value (2 bytes, e.g. for y coordinate 65 -> 0x41)
	<object surface bin>	Surface (in pixels) of the object binary value (4 bytes, e.g. for a surface of 35025 pixels -> 0x88D1)

All binary information is to be interpreted as integer numbers in little-endian format.

12.22 Error codes from the device

Definition	no error
Numeric value	0
Description	No errors
Solution/Workaround	–

Definition	undef_error
Numeric value	0010
Description	Internal error when loading an application.
Solution/Workaround	Try again. Reboot the sensor if the error occurs again.

Definition	file_error
Numeric value	0020
Description	The selected parameter is not available in the current mode.
Solution/Workaround	The parameter is only available in the process interface mode TCP/IP. The EtherNet/IP mode is not supported.

Definition	no_config_error
Numeric value	0100
Description	No application is currently loaded in the sensor.
Solution/Workaround	Some commands need a current application. If this is not the case, an error occurs.

Definition	param_error
Numeric value	0105
Description	Invalid input parameter
Solution/Workaround	Read the command documentation to send the required information to the sensor.

Definition	state_error
Numeric value	0108
Description	The sensor is in an operation mode which does not permit the execution of commands.
Solution/Workaround	Check the command documentation to see when the command can be executed.

Definition	no_memory_error
Numeric value	0110
Description	Fatal internal error.
Solution/Workaround	Reboot the sensor.

Definition	config_not_found_error
Numeric value	0902
Description	Application to be activated not found.
Solution/Workaround	Check whether the application number is correct. Check also if the application can be edited using the PC Software.

Definition	trigger_mode_error
Numeric value	1000
Description	It is not possible to trigger the sensor because the trigger function via TCP/IP is not active.
Solution/Workaround	Review the sensor configuration to change the sensor trigger mode.

Definition	invalid_image_error
Numeric value	1300
Description	Internal fault during the image transmission from/to the sensor.
Solution/Workaround	Check which is the required image format and if all parameters for the results via TCP/IP are correct. In case of a problem during the transmission of information, check whether the information to be sent is correct.

Definition	result_not_available_error
Numeric value	1600
Description	The user tries to obtain a result although no results are available in the sensor.
Solution/Workaround	–

Definition	is_decoding_error
Numeric value	1601
Description	The command cannot be executed because the sensor is currently decoding.
Solution/Workaround	Try to execute the command again.

Definition	image_type_mismatch
Numeric value	1602
Description	An image is uploaded to the sensor for evaluation. The format detected does not match that of the currently activated application.
Solution/Workaround	Edit the running application to check which is the required image format.

Definition	config_switching_active_error
Numeric value	1603
Description	It is not possible to activate an application in the sensor when the external selection of the application is activated.
Solution/Workaround	Use the PC Software to deactivate the external selection of the application.

Definition	trigger_not_available_eror
Numeric value	1604
Description	The user sends a trigger to the device via TCP/IP. Due to an internal fault the sensor cannot process the trigger.
Solution/Workaround	This error code shows a sensor failure. Normally the sensor tries to remedy the failure itself. If this error occurs again, reboot the sensor.

Definition	executing_script_error
Numeric value	1700
Description	User sends an application to the device. The internal data of this application is invalid.
Solution/Workaround	Only use applications that were created and saved via the PC operating program.

Definition	invalid_input_parameter
Numeric value	1701
Description	Invalid input parameter
Solution/Workaround	Read the command documentation to send the required information to the sensor.

Definition	wrong_input_parameter
Numeric value	1702
Description	Invalid input parameter
Solution/Workaround	Read the command documentation to send the required information to the sensor.

13 Maintenance, repair and disposal

- ► Keep the lens window clean.Soiling may considerably affect the reading result!
- ► To clean the lens window, do not use any detergents or solvents which might damage the front glass.
- ► Do not open the housing as the device does not contain any components which can be repaired by the user. The device must only be repaired by the manufacturer.
- ► Dispose of the device in accordance with the national environmental regulations.

14 Approvals/standards

The CE Declaration of Conformity is available at:
www.ifm.com → data sheet search → e.g. O2V100 → Approvals

15 Note on the software

This unit contains (maybe modified) Open Source software, which is subject to special licensing terms.

For copyright information and licensing terms please refer to:www.ifm.com/int/GNU

For software subject to the GNU General Public License or the GNU Lesser General Public License the source code can be requested against payment of the copying and shipping costs.

The software is available at:
www.ifm.com → data sheet search → e.g. O2V100 → Download/Software.